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CLAIMS

1. A measurement method comprising the steps of:  
arranging an interferometer to form a first  
5 interference fringe pattern comprising at least ten  
interference fringes;  
recording an image of said first interference  
fringe pattern;  
perturbing an optical path in the interferometer  
10 to form a second interference fringe pattern  
comprising at least ten interference fringes; and  
combining an image of said second interference  
fringe pattern with the recorded image of the first  
interference fringe pattern to produce a further image  
15 comprising a moiré fringe pattern arising from a  
difference or differences between the first and second  
interference fringe patterns.
2. A measurement method in accordance with claim 1  
20 wherein said arranging step includes the step of  
tilting a reflecting surface of the interferometer to  
increase the number of interference fringes in the  
first interference fringe pattern.
- 25 3. A measurement method in accordance with claim 1  
or claim 2 wherein said first interference pattern  
comprises at least fifty interference fringes.
- 30 4. A measurement method in accordance with <sup>claim 1</sup>any  
preceding claim wherein said second interference  
fringe pattern comprises a larger number of  
interference fringes than the first interference  
fringe pattern.
- 35 5. A measurement method in accordance with <sup>claim 1</sup>any  
preceding claim, wherein the step of perturbing  
includes the step of inserting a transparent object in

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the optical path.

6. A measurement method in accordance with <sup>claim 1</sup> any preceding claim, wherein the step of perturbing includes at least one of the steps of distorting, rotating and translating a reflecting surface in the optical path.

7. A measurement method in accordance with <sup>claim 1</sup> any preceding claim, wherein the step of perturbing includes at least one of the steps of distorting, rotating and translating a transparent object in the optical path.

8. A measurement method in accordance with <sup>claim 1</sup> any preceding claim wherein the step of perturbing includes the step of replacing a reference object with a test object.

9. A measurement method in accordance with <sup>claim 1</sup> any preceding claim wherein the step of perturbing includes at least one of the steps of disturbing a gas, and disturbing a gas flow in the optical path.

10. A measurement method in accordance with <sup>claim 1</sup> any preceding claim, wherein said image of the second interference fringe pattern is a recorded image.

11. A measurement method in accordance with <sup>claim 1</sup> any preceding claim wherein at least one of the recorded image of the first interference fringe pattern and the image of the second interference pattern is an image selected from a recorded sequence of images of the interference fringe pattern formed by the interferometer.

12. A measurement method in accordance with <sup>claim 1</sup> any-

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preceding claim, wherein the recorded image of the first interference fringe pattern and the image of the second interference fringe pattern are digital images.

5 13. A measurement method in accordance with claim 12 wherein the step of combining includes the step of subtracting one of the digital images from the other.

10 14. A measurement method in accordance with claim 13, wherein the step of combining includes the step of converting negative values obtained in the subtracting step to positive values.

15 15. A measurement method in accordance with <sup>claim 12</sup> ~~any one~~ of claims 12 to 14, wherein the digital images are images captured by a CCD camera.

16. A measurement method in accordance with <sup>claim 1</sup> ~~any~~ preceding claim, further comprising the steps of:  
20 arranging the interferometer to form a third interference fringe pattern;  
recording an image of the third interference fringe pattern;  
arranging the interferometer to form a fourth  
25 interference fringe pattern;  
recording an image of the fourth interference fringe pattern, wherein the first, third and fourth interference fringe patterns are phase shifted from each other by predetermined amounts; and  
30 combining the image of the second interference fringe pattern with each of the recorded images of the first, third and fourth interference fringe patterns to produce respective said further images; and  
processing the further images to produce a phase  
35 map of the perturbation of the optical path.

17. A measurement method in accordance with claim 16

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wherein said images of the third and fourth interference fringe patterns are digital images.

18. A measurement method comprising the steps of:

5       arranging an interferometer to form an interference fringe pattern comprising at least ten interference fringes;

      recording an image of the interference fringe pattern at a selected time;

10       perturbing an optical path in the interferometer to alter the interference fringe pattern;

      combining the recorded image with each one of a sequence of images of the interference fringe pattern at respective different times to produce a sequence of  
15       respective further images each comprising a moiré fringe pattern arising from a difference between the recorded image and the respective one of the sequence of images.

20       19. A measurement method in accordance with claim 18 wherein the recorded image and the sequential images are digital images.

25       20. A measurement method in accordance with claim 19 wherein the step of combining includes the step of subtracting one digital image from another.

30       21. A measurement method in accordance with claim 20, further comprising the step of displaying the sequence of respective further images.

35       22. A measurement method in accordance with claim 21, wherein the sequence of images of the interference fringe pattern is captured by a camera at a rate, and the sequence of respective further images is displayed at or substantially at said rate.

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23. Measurement apparatus comprising:

an interferometer arranged to form interference fringe patterns comprising at least ten interference fringes;

a camera arranged to capture images of the interference fringe patterns;

an image store arranged to store an image of the interference fringe pattern captured by the camera at a selected time;

an image processor arranged to combine the stored image with an image of the interference fringe pattern captured by the camera at a different time to produce a further image comprising a moiré fringe pattern arising from a difference or differences between the interference fringe patterns at the selected and said different time.

24. Measurement apparatus in accordance with claim 23 wherein the interferometer is arranged to form interference fringe patterns comprising at least fifty interference fringes.

25. Measurement apparatus in accordance with <sup>claim 23</sup> any one of claims 23 or 24, wherein said images are digital images.

26. Measurement apparatus in accordance with claim 25, wherein the image processor is arranged to produce the further image by a process including at least the subtraction of one of the digital images from the other.

27. Measurement apparatus in accordance with claim 26 wherein the image processor is arranged to produce the further image by a process including the conversion of negative values obtained in the subtraction to positive values.

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claim 23

26. Measurement apparatus in accordance with ~~any one~~ <sup>any one</sup> of claims 23 to 27, wherein the interferometer includes means for phase shifting the interference fringe patterns by predetermined amounts,

the image store is arranged to store images of the interference fringe patterns captured by the camera at at least three different selected times,

the image processor is arranged to combine each stored image with said image captured at a different time to produce a respective further image comprising a respective moiré fringe pattern, and

the image processor is further arranged to process the further images to produce a phase map.

claim 23

29. Measurement apparatus in accordance with ~~any one~~ <sup>any one</sup> of claims 23 to 28 wherein the camera is arranged to output a sequence of said captured images,

the image processor is arranged to combine the or one of the stored images with each one of the sequence of captured images in turn to produce a respective said further image,

the apparatus further comprising at least one of: a display for displaying the sequence of further images; and means for storing the sequence of further images.

30. Measurement apparatus in accordance with claim 29, wherein the camera is arranged to output the sequence of captured images at a rate, and the apparatus is further arranged to display the sequence of further images at said rate.

claim 23

31. Measurement apparatus in accordance with ~~any one~~ <sup>any one</sup> of claims 23 to 29, further comprising an image recorder for recording the images captured by the camera, and an image selector for selecting one of the

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recorded images as an image to be stored in the image store or an image to be combined with a stored image.

32. Measurement apparatus in accordance with <sup>claim 23</sup> ~~any one~~ of claims ~~23 to 31~~ wherein the camera is a CCD camera.
33. Measurement apparatus in accordance with <sup>claim 23</sup> ~~any one~~ of claims ~~23 to 32~~, wherein the interferometer has an aperture of at least 10 cm.
34. A measurement method substantially as hereinbefore described with reference to the accompanying drawings.
35. Measurement apparatus a measurement method substantially as hereinbefore described with reference to the accompanying drawings.